"What can navel-gazing teach us about the microbial ecology of the ISS?".

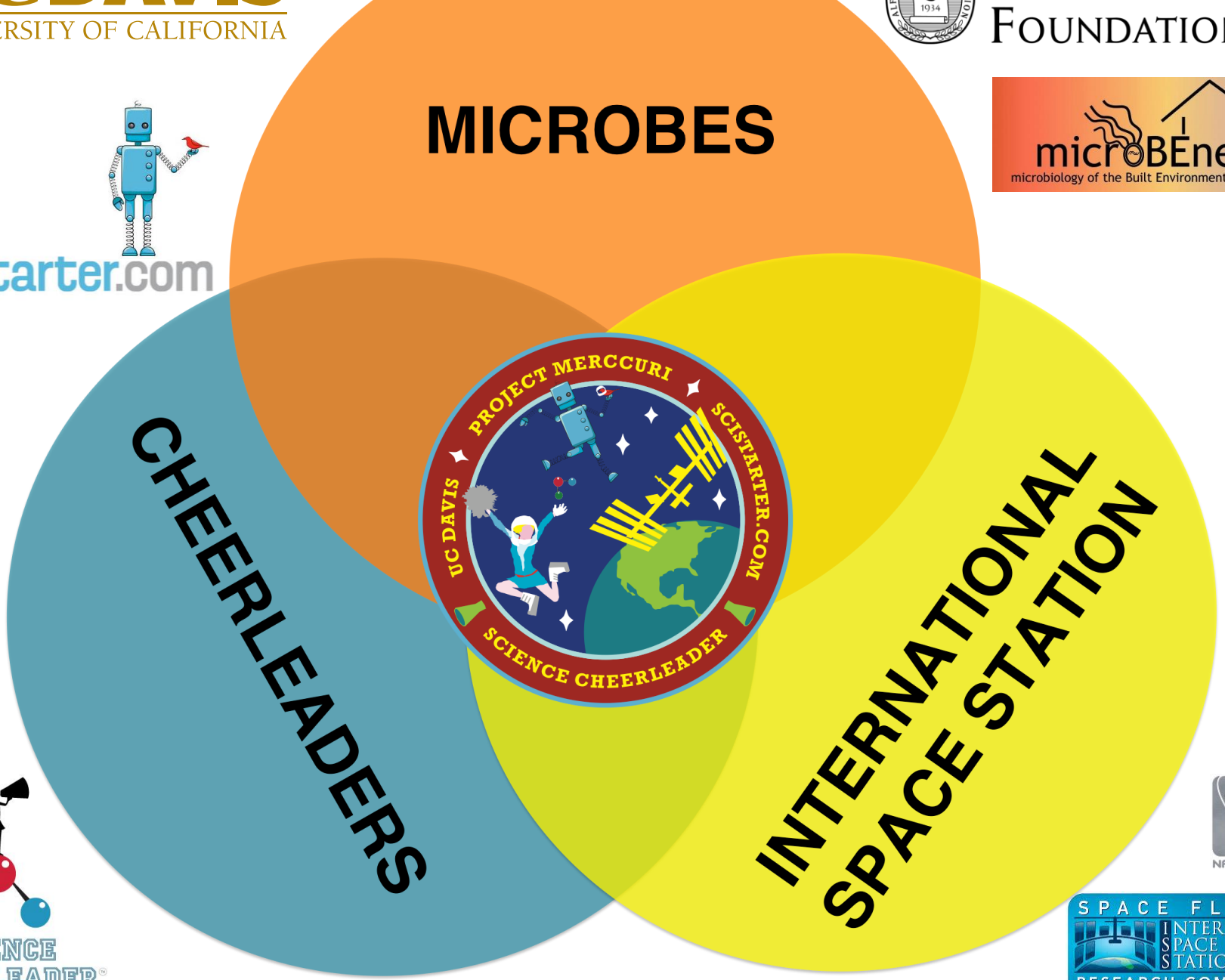
Dr. Jenna Lang
UC Davis
(jennomics)

UC DAVIS
UNIVERSITY OF CALIFORNIA

ALFRED P. SLOAN FOUNDATION

scistarter.com

microBEnet
microbiology of the Built Environment network



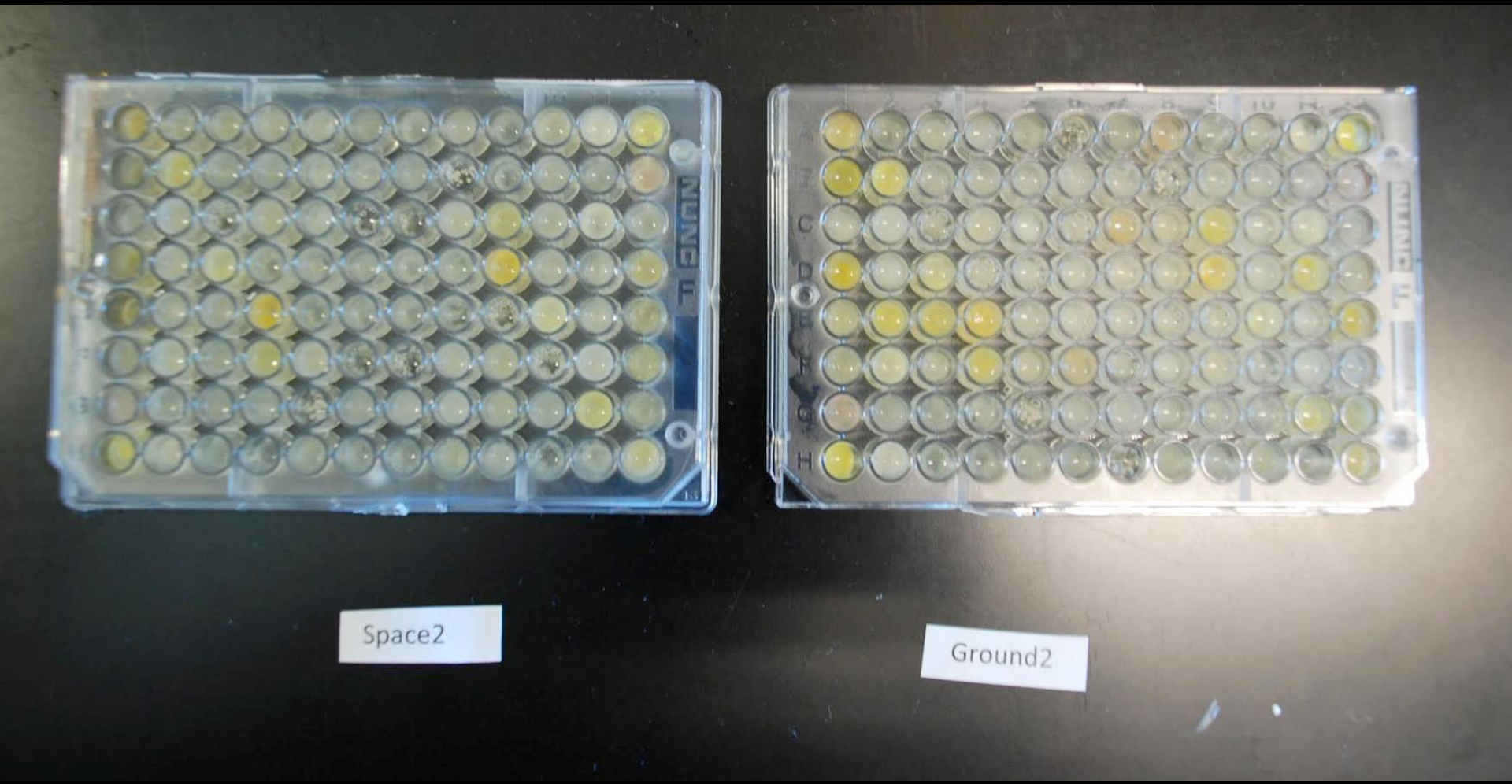
SCIENCE CHEERLEADER®

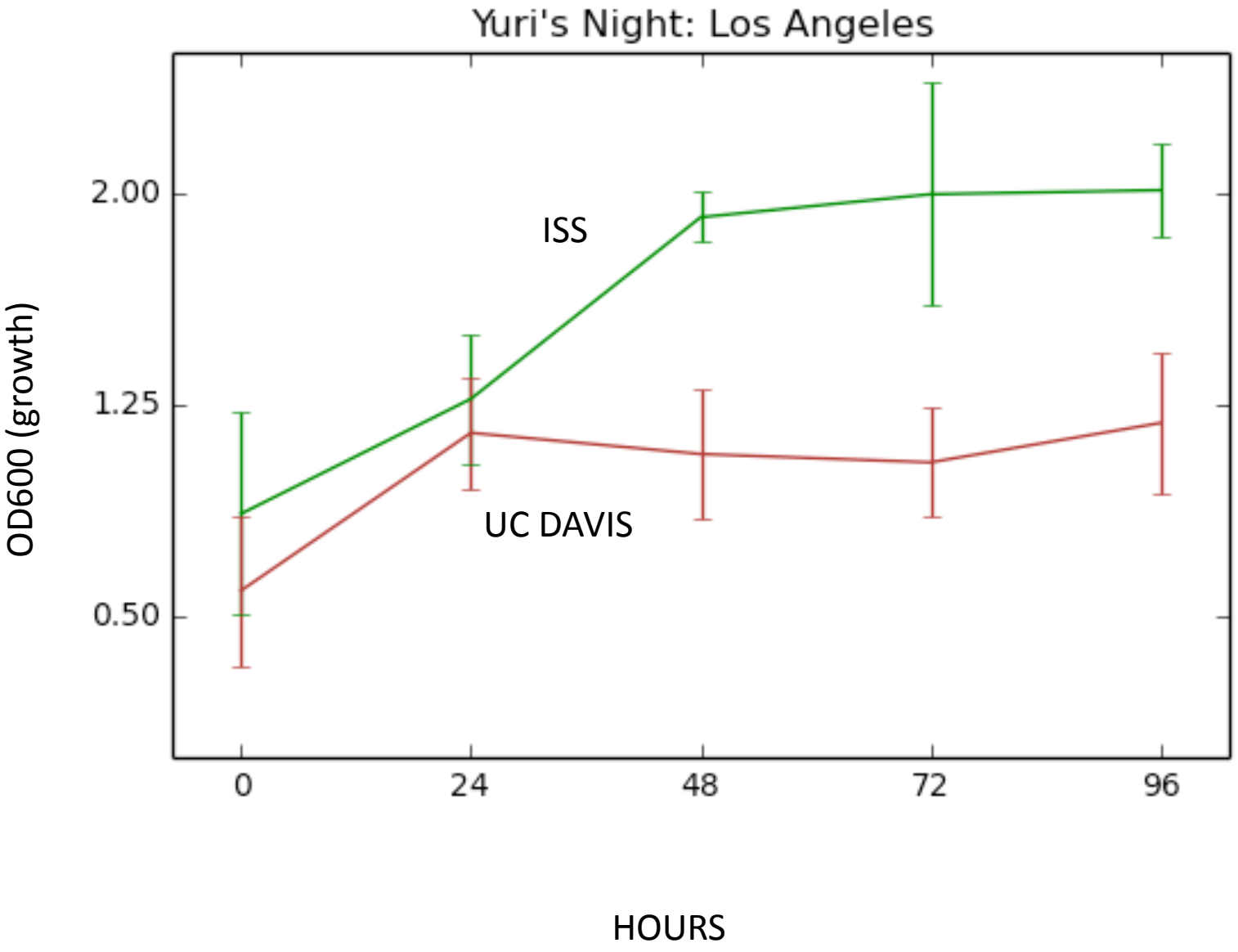
NANORACKS

SPACE FLORIDA
INTERNATIONAL SPACE STATION
RESEARCH COMPETITION


SPURS
FAMILY


STAND

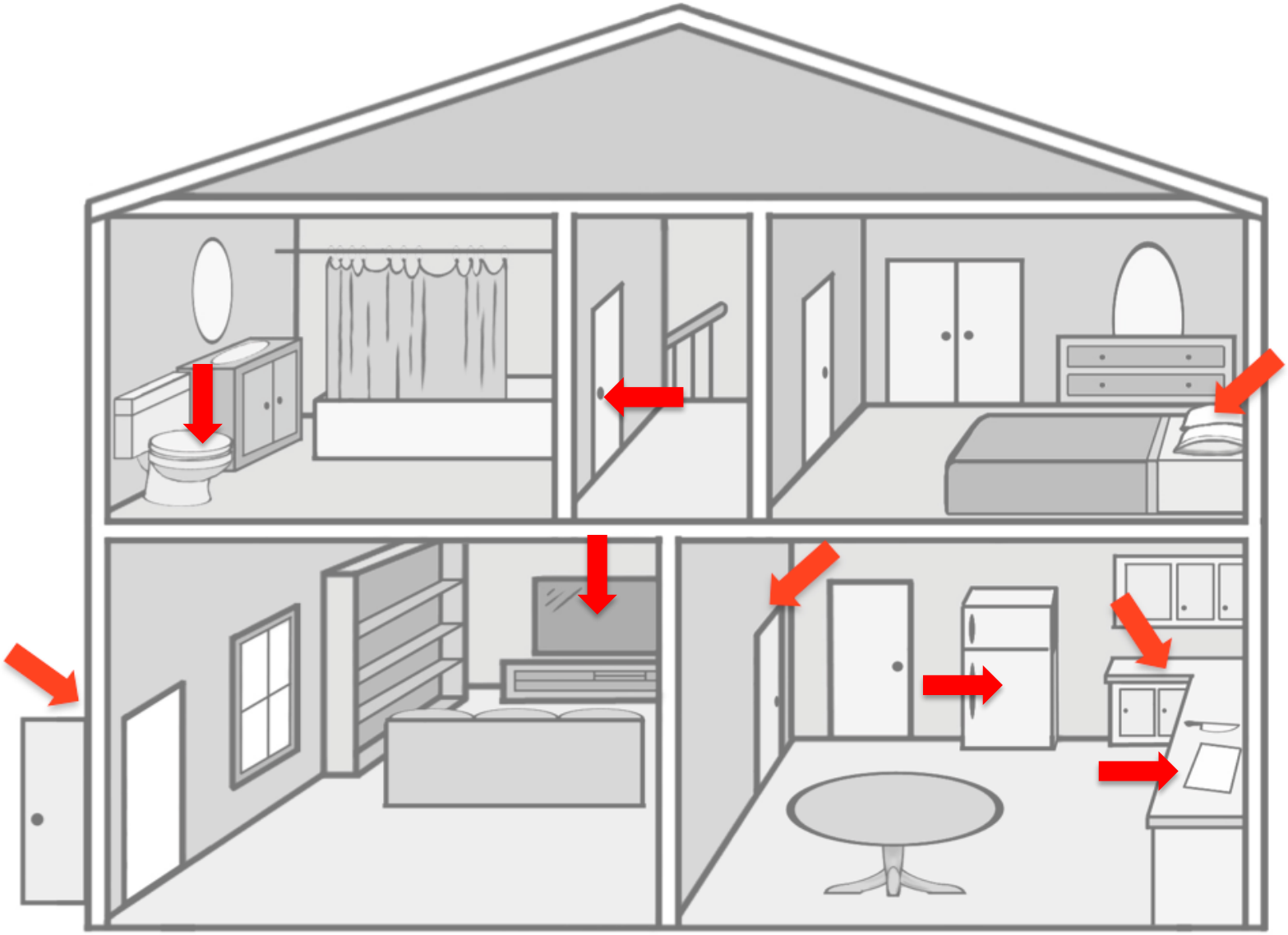

Space2
Ground2


Yuri's Night: Los Angeles
2.00
1.25
0.50
OD600 (growth)
ISS
UC DAVIS
0
24
48
72
96
HOURS


earth
microbiome project

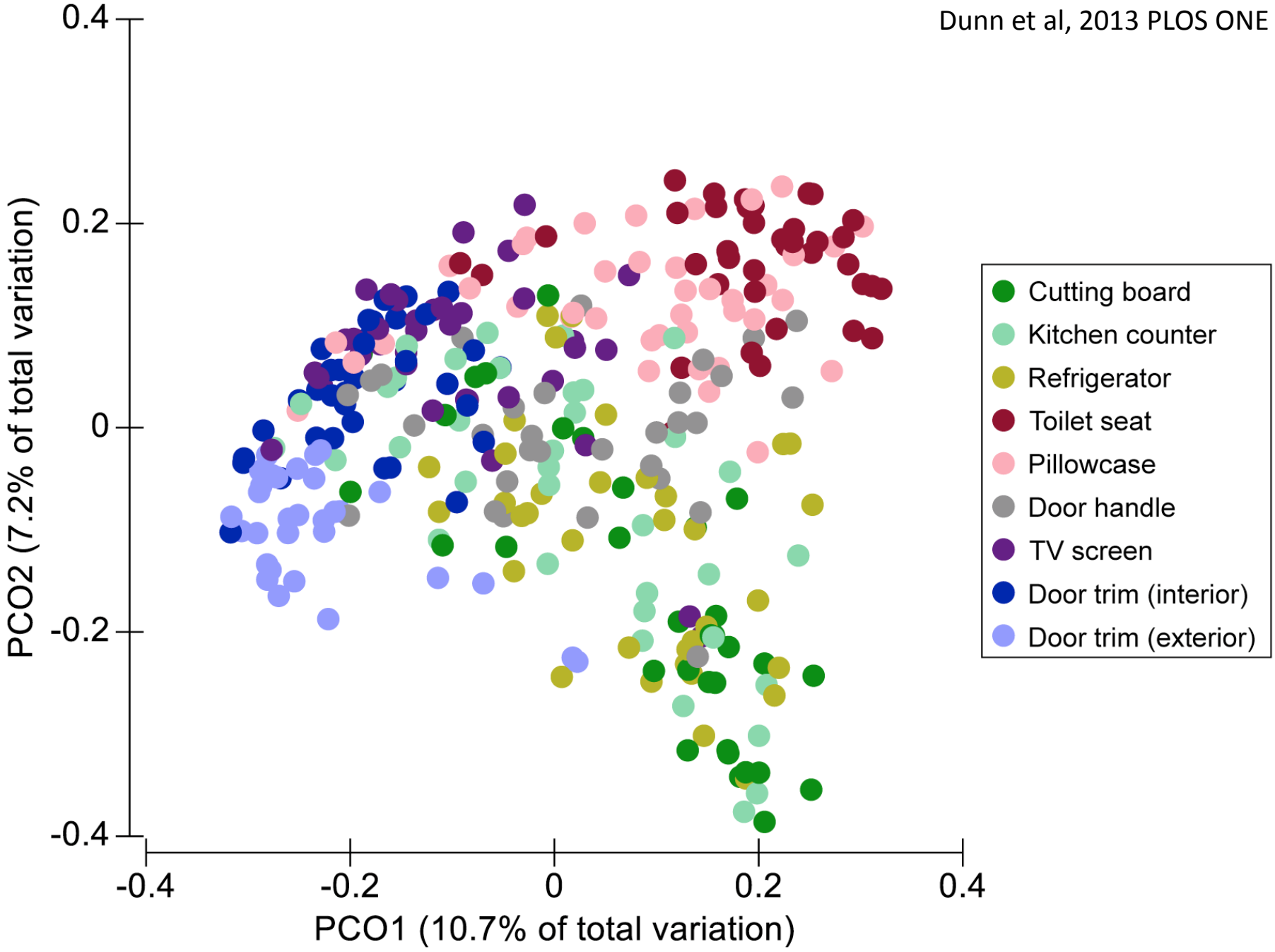
"Wildlife of Our Homes"

Dunn et al, 2013 PLOS ONE

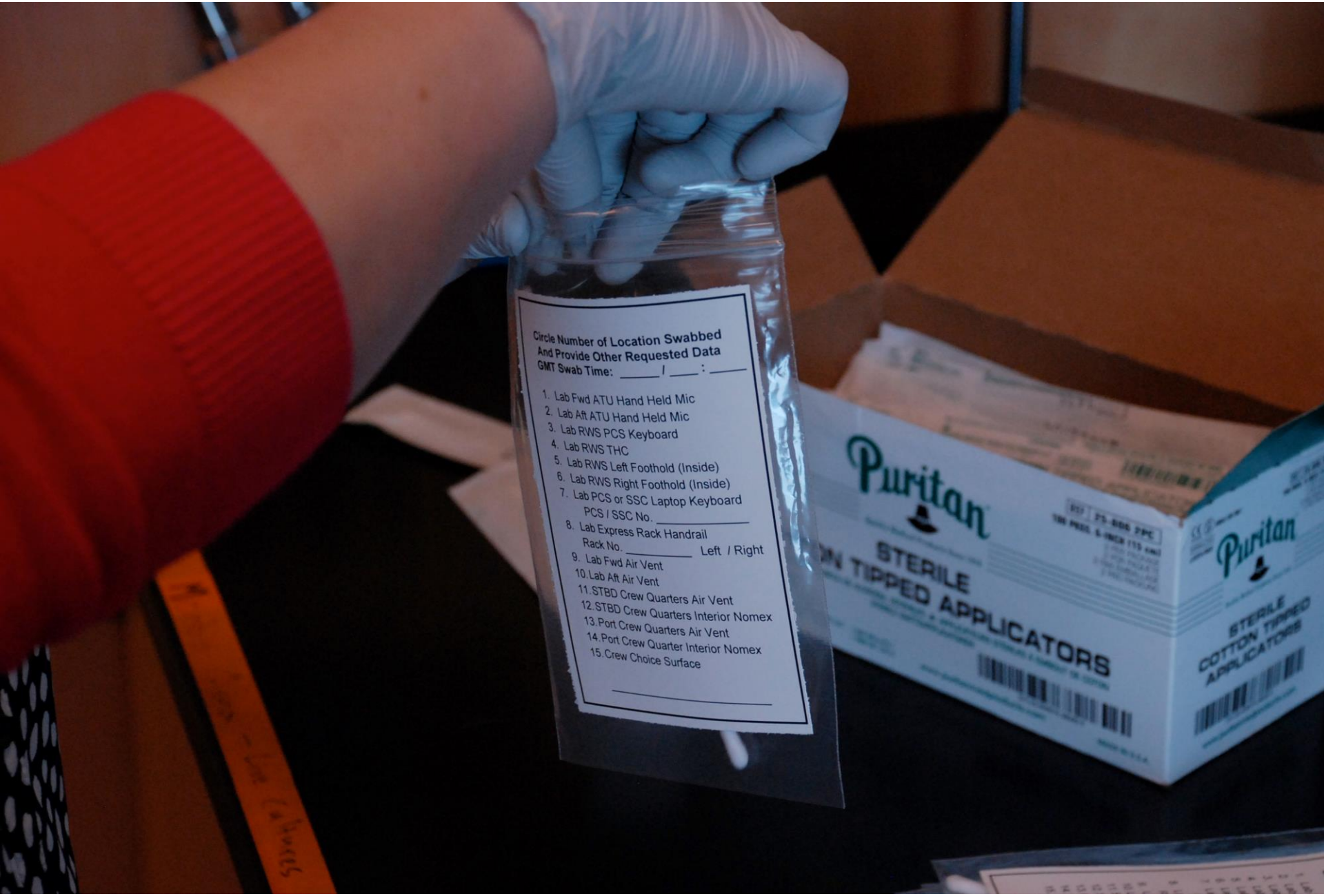


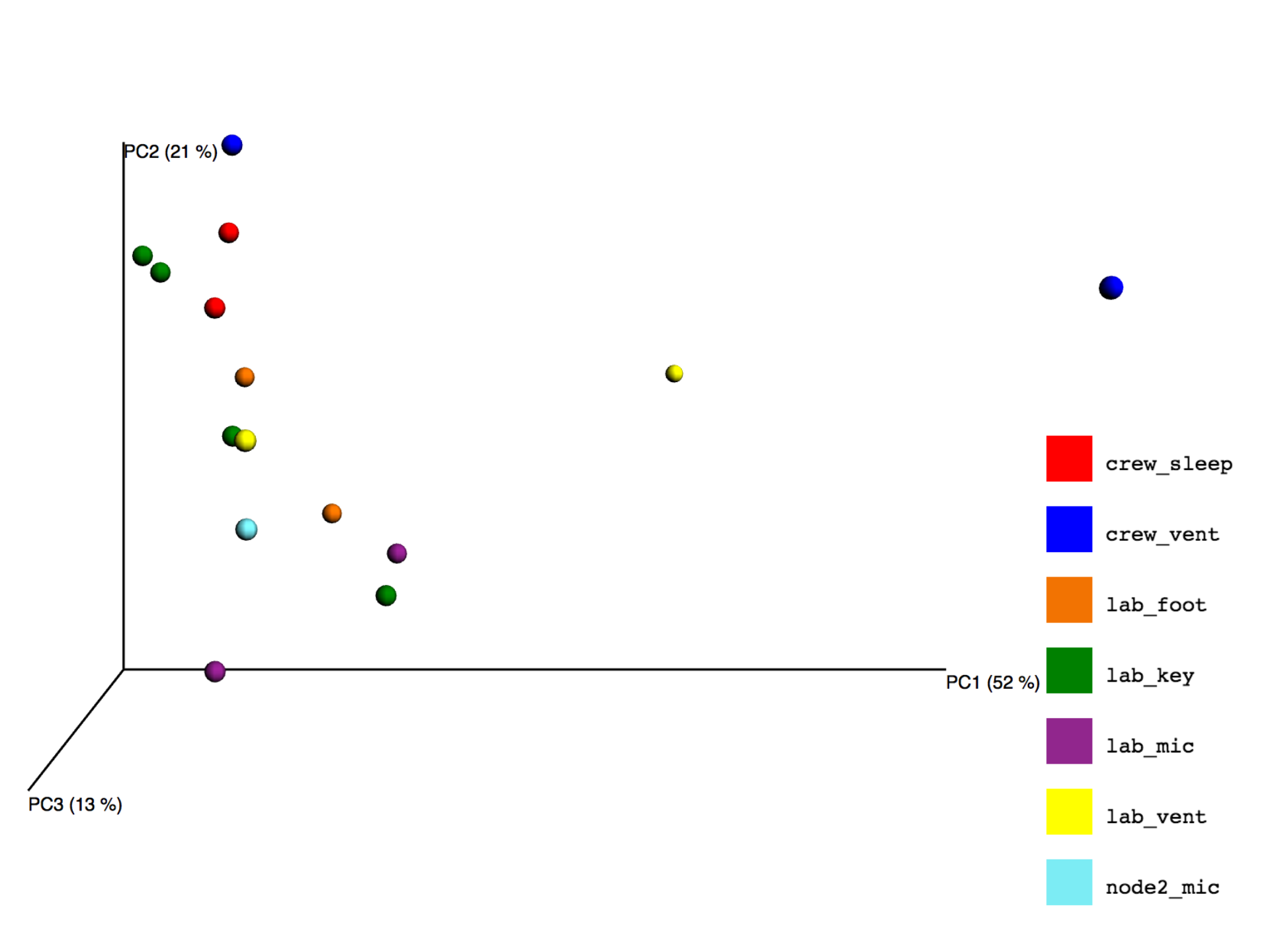
Home life: factors structuring the bacterial diversity found within and between homes.

Dunn et al, 2013 PLOS ONE

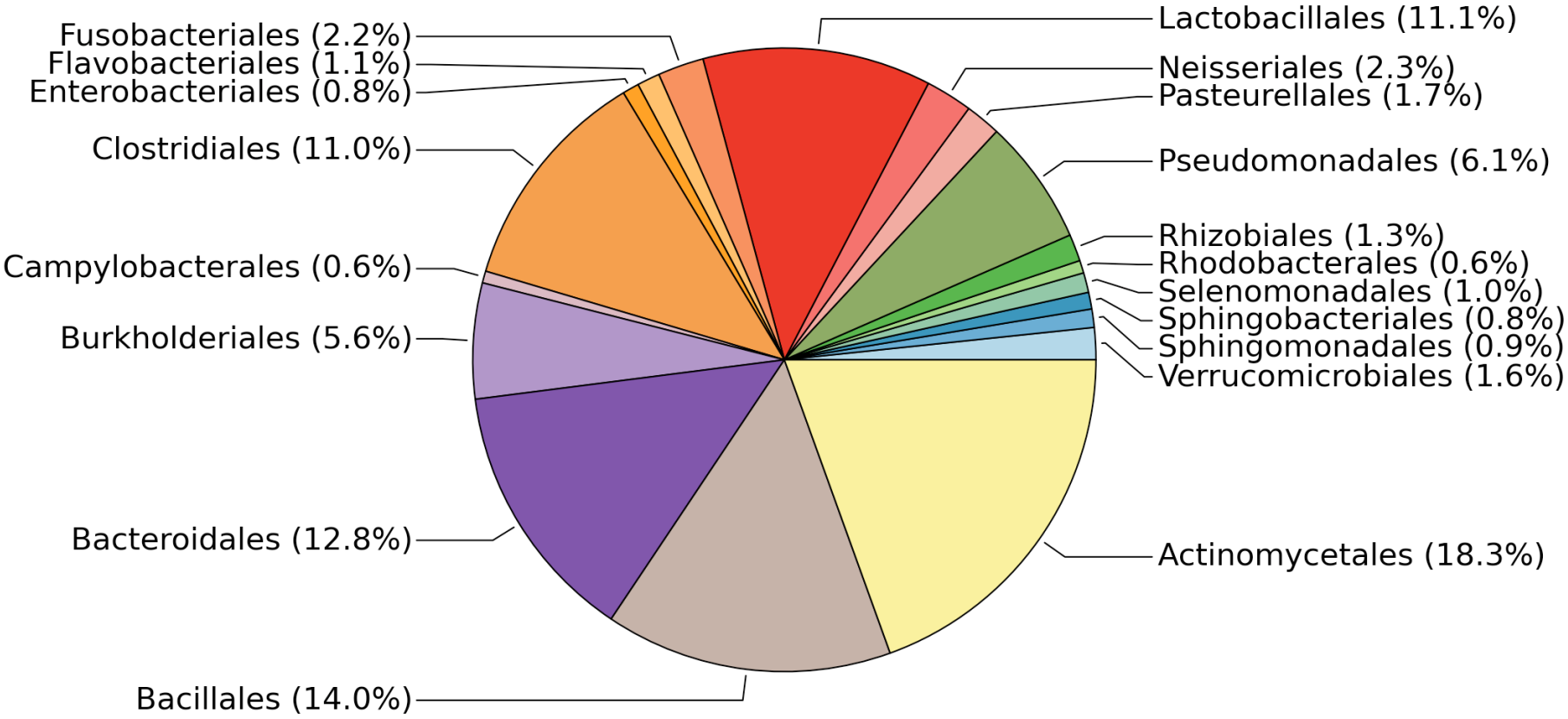


Home life: factors structuring the bacterial diversity found within and between homes.

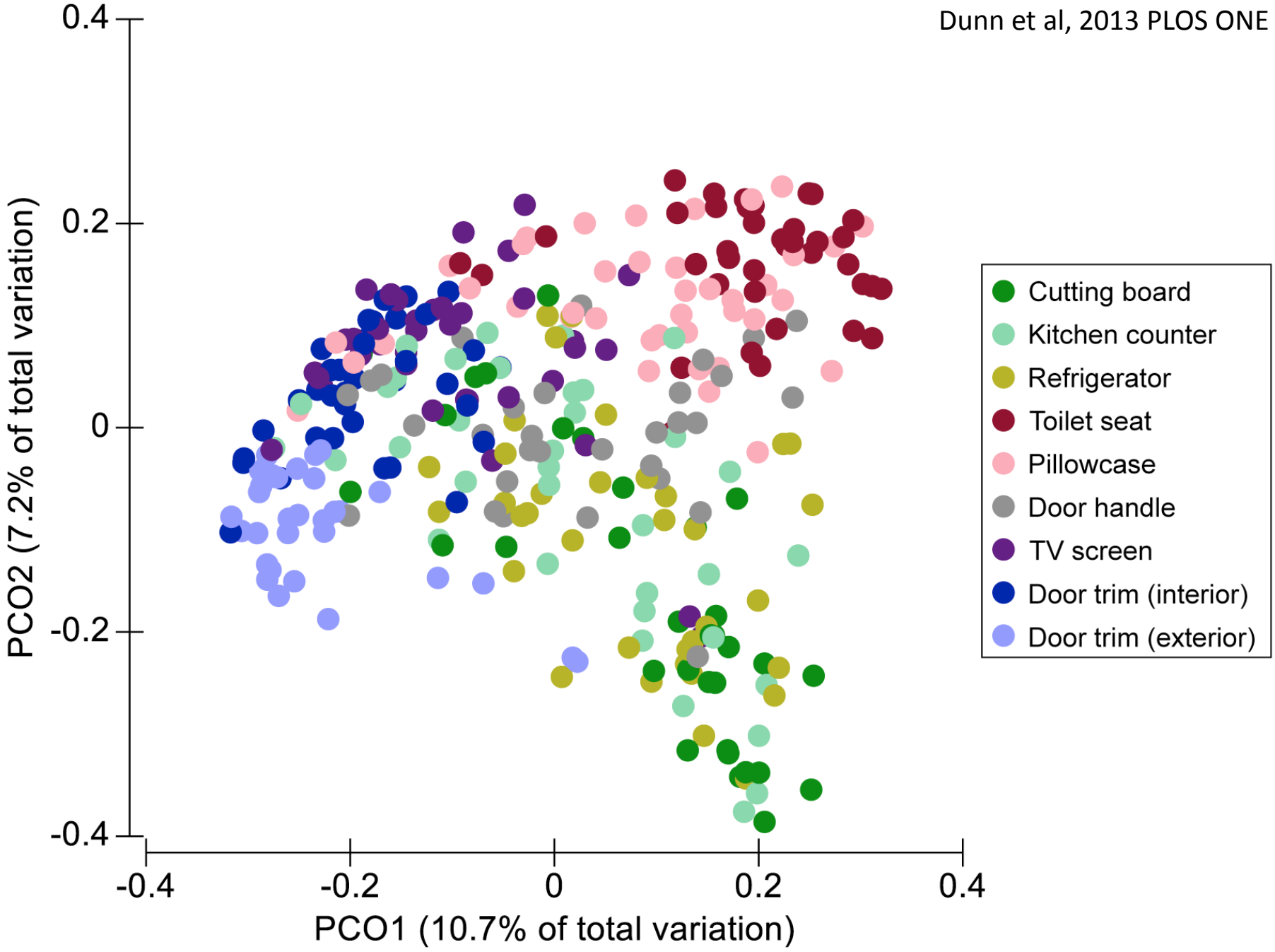

Circle Number of Location Swabbed
And Provide Other Requested Data
GMT Swab Time: _____/ ___ : ____
1. Lab Fwd ATU Hand Held Mic
2. Lab Aft ATU Hand Held Mic
3. Lab RWS PCS Keyboard
4. Lab RWS THC
5. Lab RWS Left Foothold (Inside)
6. Lab RWS Right Foothold (Inside)
7. Lab PCS or SSC Laptop Keyboard
PCS / SSC No. _____
8. Lab Express Rack Handrail
Rack No. _____ Left / Right
9. Lab Fwd Air Vent
10. Lab Aft Air Vent
11. STBD Crew Quarters Air Vent
12. STBD Crew Quarters Interior Nomex
13. Port Crew Quarters Air Vent
14. Port Crew Quarter Interior Nomex
15. Crew Choice Surface
_____
Puritan
STERILE
TIPPED APPLICATORS
Puritan
STERILE
COTTON TIPPED
APPLICATORS


PC2 (21 %)
PC1 (52 %)
PC3 (13 %)
crew_sleep
crew_vent
lab_foot
lab_key
lab_mic
lab_vent
node2_mic

Family composition of all 15 ISS surface samples

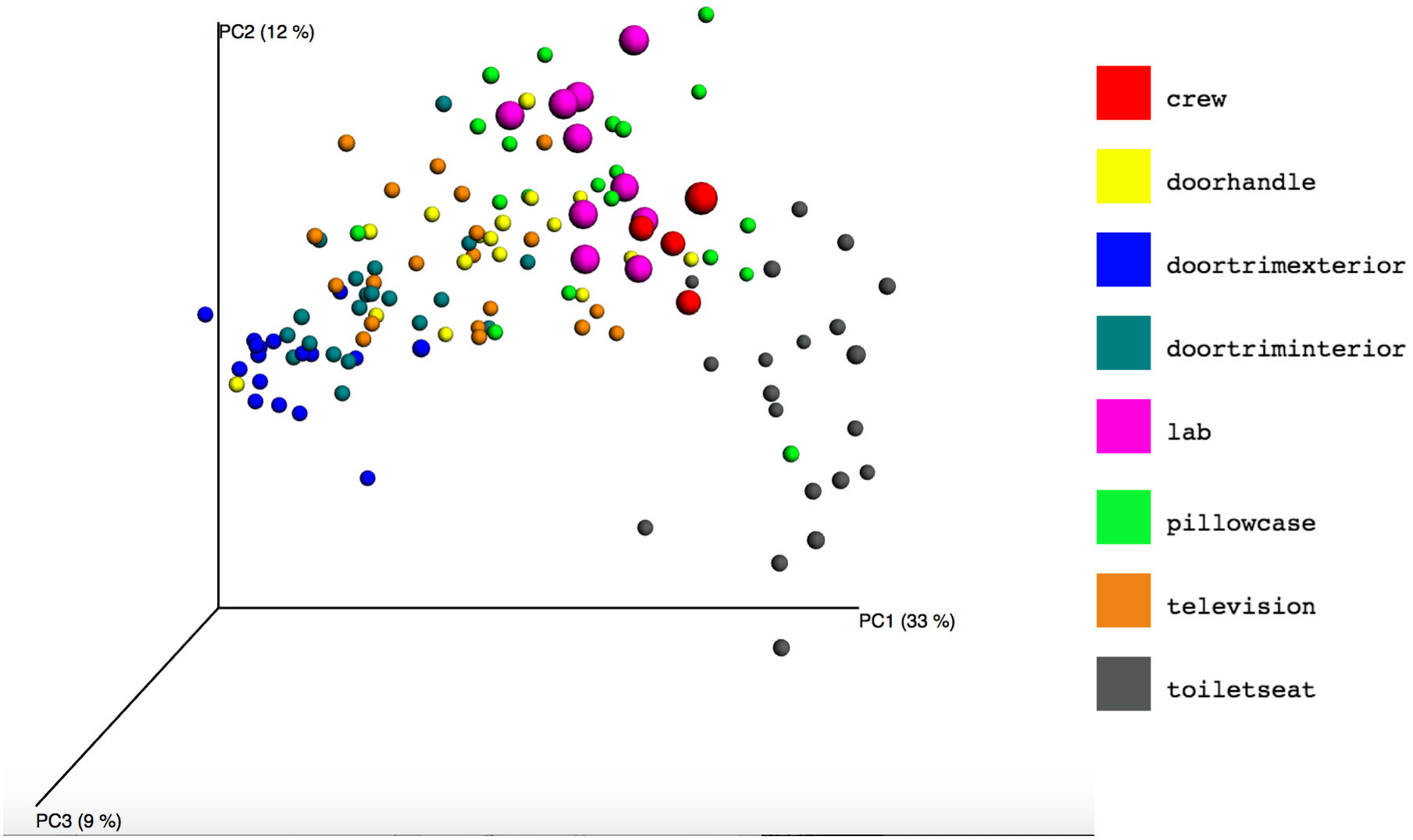


Dunn et al, 2013 PLOS ONE



Home life: factors structuring the bacterial diversity found within and between homes.

How do the ISS surfaces compare to surfaces in homes?



Dunn et al, 2013 PLOS ONE

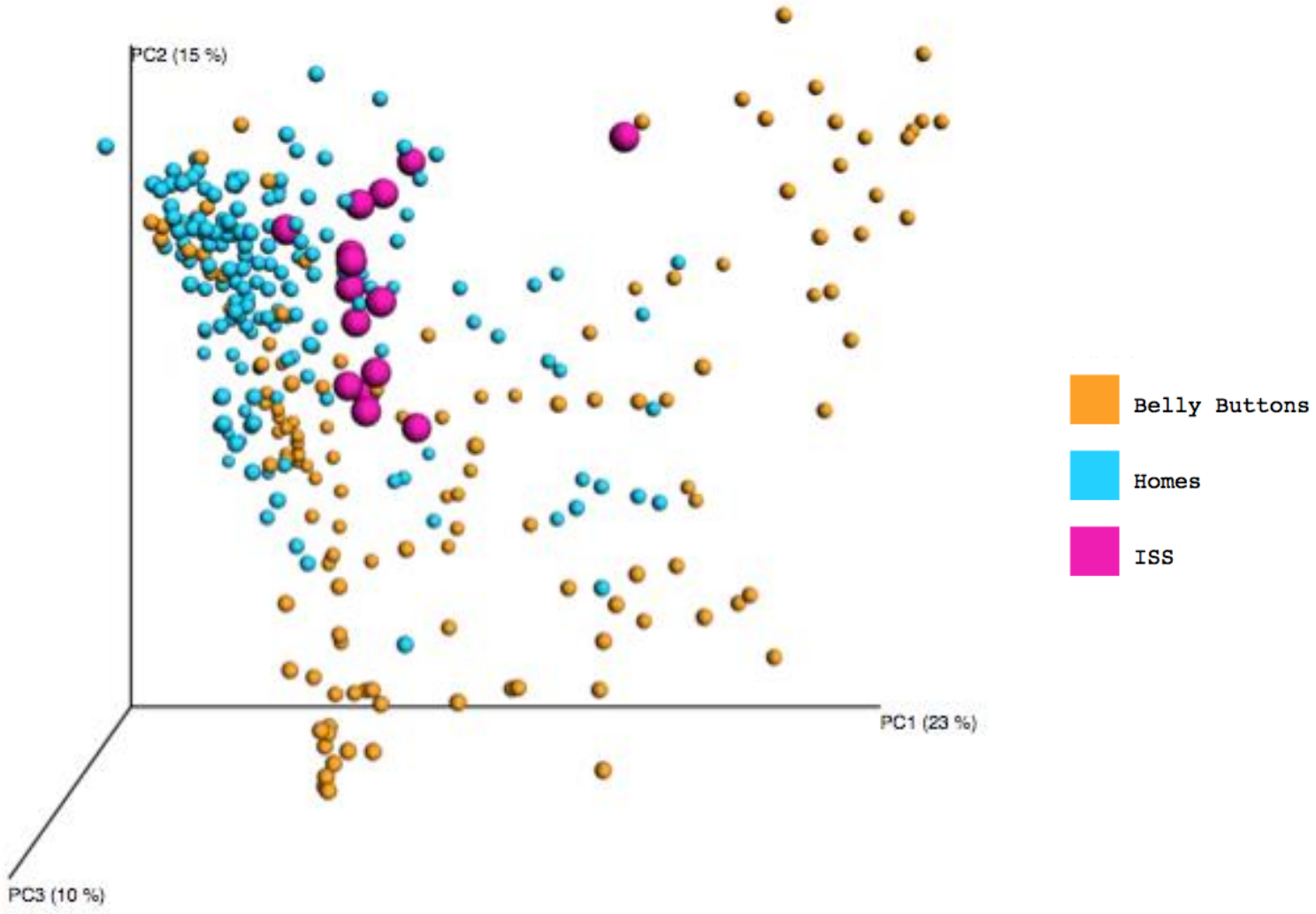
	Human skin	Human oral cavity	Human stool	Leaves	Soil
Cutting board	0.6	0.7	0.1	1.2	0.6
Kitchen counter	2.5	2.4	0.4	1.8	1.2
Refrigerator	2.0	1.3	0.2	1.1	0.7
Toilet seat	17.2	7.9	5.7	0.1	0.3
Pillowcase	9.3	24.2	1.3	0.6	0.7
Door handle	5.7	9.0	0.7	1.2	2.5
Television	7.9	6.4	1.9	1.7	3.3
Door trim (interior)	4.8	2.3	1.7	3.3	4.8
Door trim (exterior)	0.7	0.2	0.2	3.7	7.0

Home life: factors structuring the bacterial diversity found within and between homes.

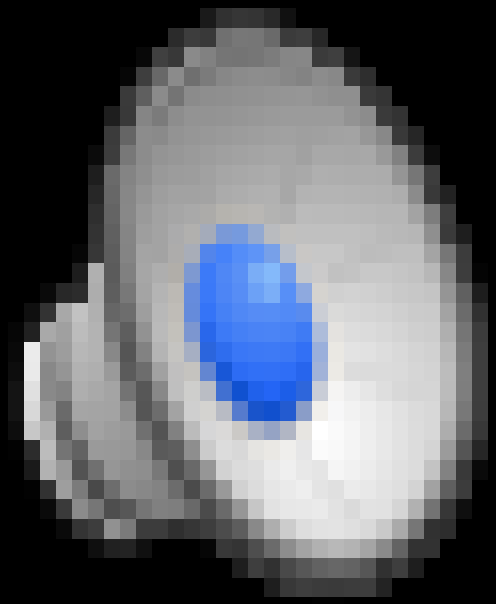
BELLY BUTTON BIODIVERSITY

The coolest study of biodiversity on the human body on the planet!

The ISS looks like a home on Earth, homes look like belly buttons

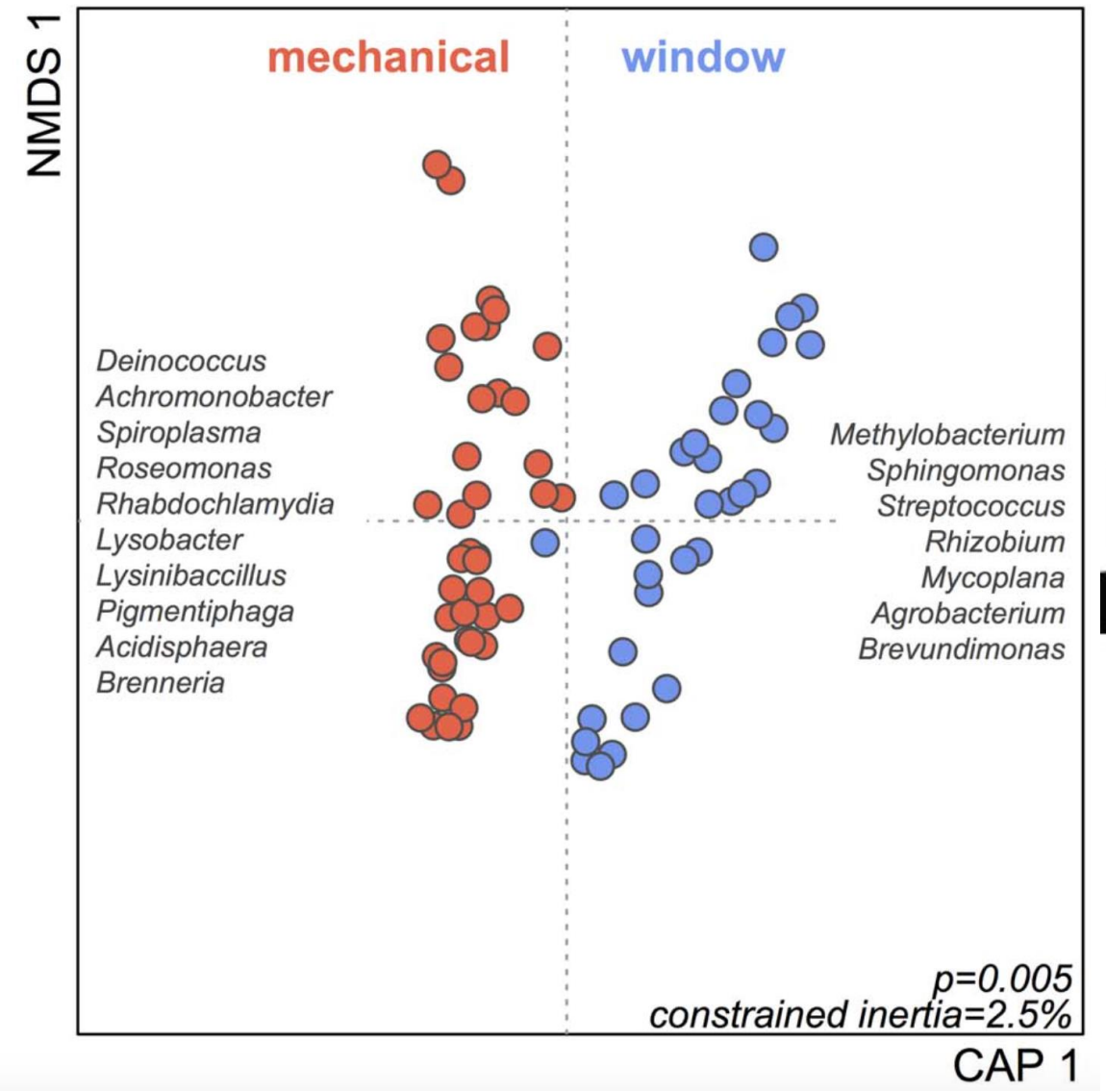


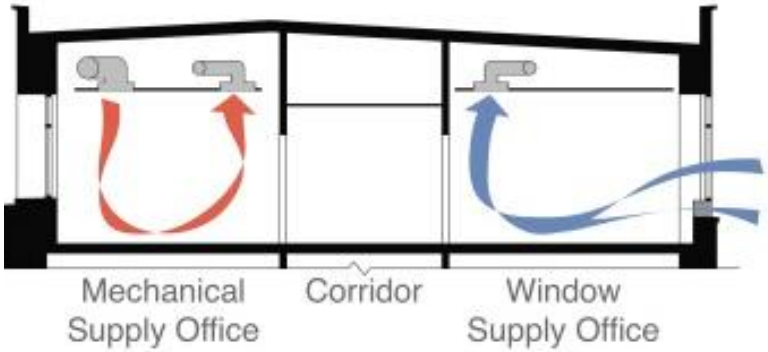
How does building design influence microbial communities in the built environment?



This animation was created by the Biology and the Built Environment (BioBE) Center
with Cameron Slayden (Cosmocyte) and funded by the Alfred P. Sloan Foundation

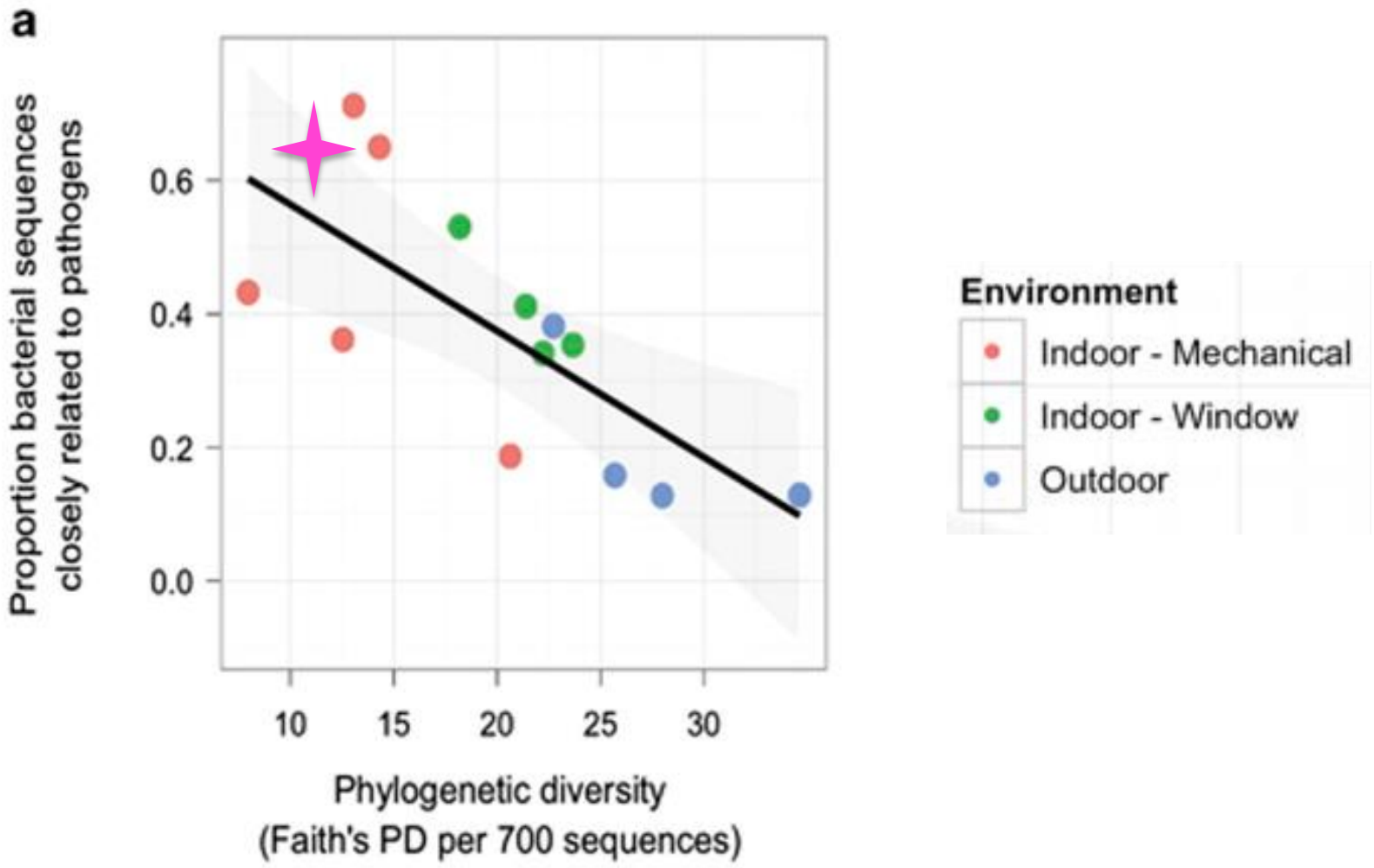
Kembel et al, 2012 ISME Journal





Architectural Design Drives the Biogeography of Indoor Bacterial Communities

Kembel et al, 2014 PLOS ONE

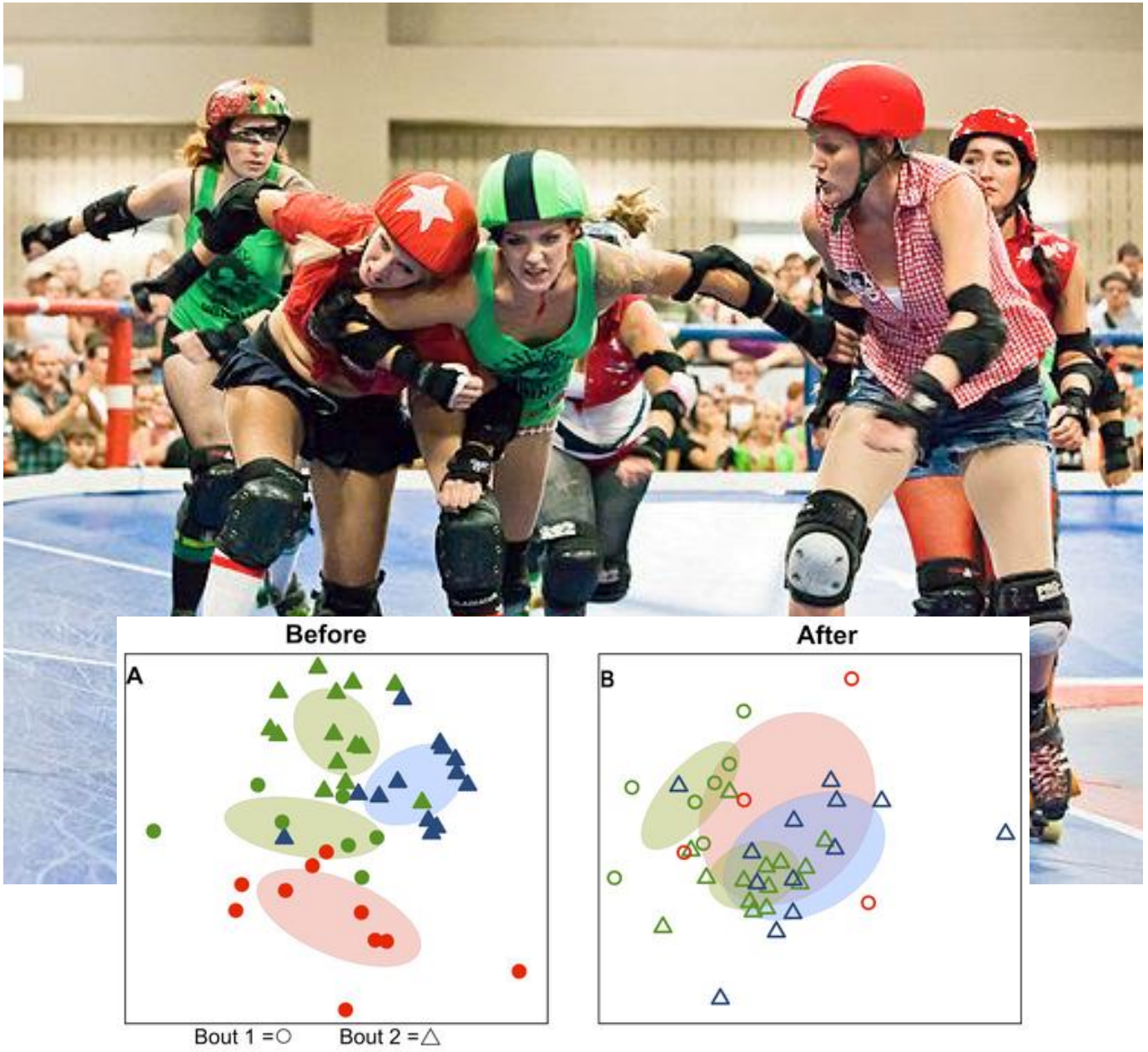


Architectural design influences the diversity and structure of the built environment microbiome

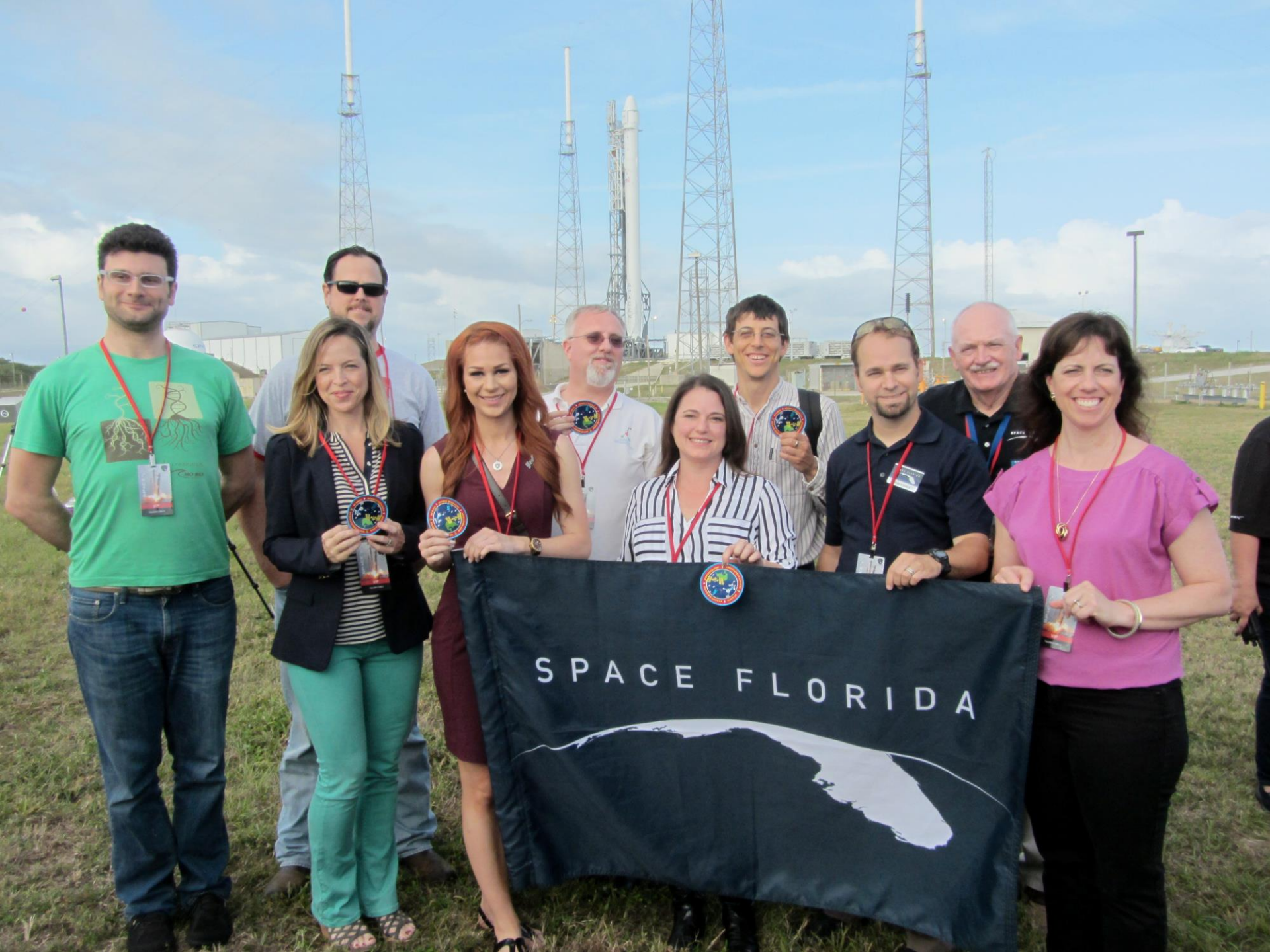
Knowledge gaps

- Dead or alive?
- How does radiation affect microbial ecology?
- What is a "healthy" indoor microbiome?
- How could we engineer a healthy indoor microbiome?
- How do microbes disperse in zero-gravity?
- What are the consequences of bottleneck/containment?

Meadow et al, 2013 PeerJ



Significant changes in the skin microbiome mediated by the sport of roller derby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microbiology of the Built Environment network

Connecting
Communicating
Collaborating
Curating

Microbial Ecology
and
Building Science